



**Meet Mark Sellers**  
*For Div. 9000 ALD, diverse career stops all pointed toward Sandia leadership role . . . Page 8*

# Glowing designer sponges

## New MOF particles engineered to image and treat

By Mollie Rappe

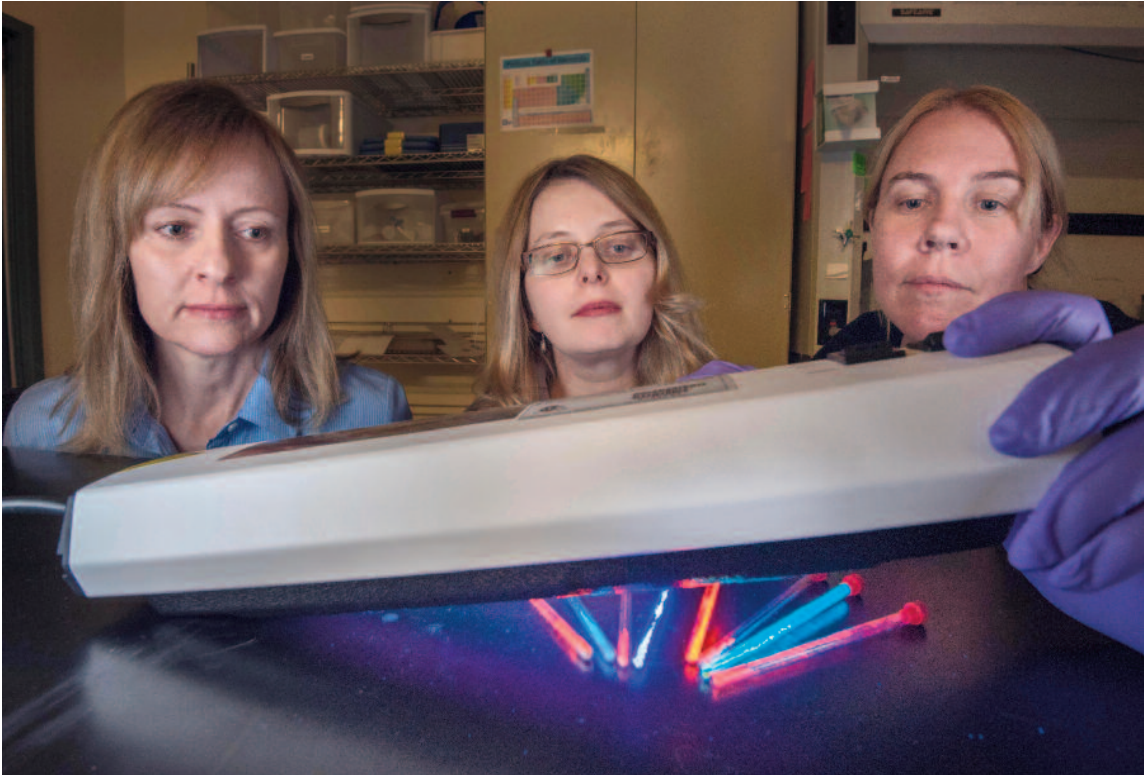
**A** Sandia team has designed and synthesized nanoparticles that glow red and are stable, useful properties for tracking cancer growth and the disease’s spread.

This work is the first time the intrinsic luminescence of metal-organic framework materials, or MOFs, for long-term bio-imaging has been reported, materials chemist Dorina Sava Gallis says. Fluorescently tagging tumors, or other specific kinds of cells, is a new, powerful method to image inside a body.

MRIs, X-rays, and ultrasounds are powerful bio-imaging methods to diagnose diseases. However, these methods each have their limitations and generally aren’t used to treat diseases. For years, scientists have been searching for theranostic agents, materials that have both therapeutic and diagnostic uses.

### ‘Hubs’ and ‘rods’

MOFs are one group of chemicals with great potential for imaging and treating cancer and other diseases. These tinker toy-like molecules have metal “hubs” and carbon-based linker “rods.” Chemists can swap out the hubs and the linkers to make nano-



RESEARCHERS Lauren Rohwer, left, Dorina Sava Gallis, and Kim Butler are members of a Sandia team that has designed and synthesized metal-organic framework nanoparticles that glow red or near infrared for at least two days in cells. That capability could prove useful in tracking the spread of cancer cells. (Photo by Randy Montoya)

sized “sponges” with many different properties. Historically, MOFs have been used for everything from capturing radioactive gases from spent nuclear fuel, to cleaning contaminated water, and even storing hydrogen gas safely.

The Sandia team’s MOF nanoparticles glow red or

near infrared for at least two days in cells.

Near infrared light has longer wavelengths than red light. It is especially useful for imaging inside a body because it can penetrate skin, tissue, and even bone without causing damage, and produces clearer images because there’s less background autofluorescence at those wavelengths, says Dorina. Current dyes or nanoparticles that glow in the near infrared don’t last for very long or only glow weakly, making brighter,

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### A Valentine’s Card to the community

Sandia donates \$50,000 to support United Way initiative. . . . . 7

## Seeing stars

### Sandia team designs a new way for additive manufacturing

PROJECT LEAD TED WINROW with the telescope he and his team built using advanced manufacturing techniques. (Photo by Randy Montoya)

By Sue Major Holmes

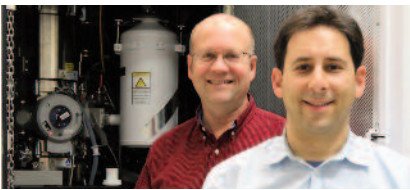
A Sandia team built a telescope to demonstrate how to design for additive manufacturing, familiarly known as 3-D printing, to take advantage of the technique’s strengths and weaknesses.

The three-year Laboratory Directed Research and Development project proved the feasibility of using additive manufacturing as an entirely new design tool, vastly different from the standard technique of moving from hand drawing to computer-assisted design to machining parts, says Ted Winrow, a mechanical engineer who led the project.

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Danelle Tanner is first Sandian named LGBTQ+ Scientist of the Year . . . . . 5



State-of-the-art transmission electron microscope goes online . . . . . 3

## HEADS UP! Emergency notifications now available on PEDs at Sandia/New Mexico

By Lindsey Kibler and Alicia Bustillos

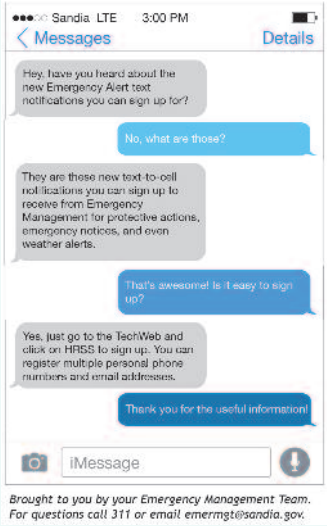
MEMBERS OF THE WORKFORCE can now register to receive New Mexico site emergency text-to-cell notifications on their portable electronic devices (PEDs), thanks to a new Emergency Management notification system.

“The program enhances the emergency notification system we use now. After PEDs were permitted in limited areas, we began to look at better ways for Sandia personnel to receive emergency notifications, and this was the best solution,” says Jennifer Gonzales, the team lead overseeing the project.

The system is similar to emergency notifications at colleges and universities, and does not require users to provide personally identifiable information to receive notifications. All Sandia email accounts and Sandia-owned devices are automatically registered into the notification system. The system will send emergency alerts when an incident requires the workforce to take protective actions, such as shelter in place, lock down, and directed evacuations. In addition, delays and closures related to inclement weather will be sent. Users will not be able to opt out of these messages.

Users can add up to three additional phone numbers, like a home, personal cell, or pager, and up to three personal email addresses.

“This enhancement to the system will allow more personnel to receive emergency notifications almost immediately. This was not possible when we had the restrictions on personal electronic devices,” says Emergency Management manager Eugene McPeck.



To register, members of the workforce must access their Personal Details profile found in HR Self Service on TechWeb. Notifications may be delivered before or after work hours. Emergency emails will continue to be sent from Emergency Management (emergmt@sandia.gov) and non-emergency emails from Sandia Advisory (snladv@sandia.gov).

To enroll for notifications, go to HR Self Service, Personal Details, Emergency Alerts to register.



That’s that

It’s the end of an era, one that has gone out not with a bang but a whimper.

I heard on the radio the other day that Best Buy, which has struggled in recent years to survive as a bricks-and-mortar business in the face of the online shopping juggernaut, has decided to stop selling CDs in its stores. The move, announced last week, takes effect July 1.

According to news reports, CD sales peaked in the US in 1999 when music lovers bought almost 1 billion discs. By last year, sales had collapsed by more than 90 percent. Faced with that stark reality, Best Buy management came to the perfectly reasonable conclusion that it couldn’t afford to give over valuable shelf space to products that just sit there gathering dust. Reportedly, Target is about to go the same route and I would guess there will be a domino effect from there.

We’ve all seen this coming for a long time, of course. I can’t remember the last time I bought a new CD and I don’t lament their passing. Does anyone?

I wonder if, even as we were buying them by the billions, we ever really developed the affection for them that we did for LPs in the golden age of vinyl records. Vinyl had such an appeal, in fact, that it is enjoying a renaissance – even industry titan Taylor Swift has released records in the format. Total sales of LPs are minuscule compared to the overall music market but they are up by orders of magnitude over where they were 25 years ago when CDs almost dealt them a death blow. What’s driving the interest? There are a lot of factors but I think a personal anecdote may at least partly explain their enduring allure.

In the summer of 1967, I was working on a sheep ranch high up in the Bighorn Mountains above Powder River, Wyoming. We were 25 miles off the pavement in some of the most spectacular and remote country you can imagine. There I was, a kid from “Back East” with a guitar, long hair, a backpack, and nothing else. I’d gotten the job through family connections – my aunt and uncle had at one time owned the general store in Powder River and knew all the ranchers in the area. They set me up for the summer with one of the bigger operations, which at the time I didn’t think was such a great thing. I’d rather have spent the summer surfing at Ocean City with my buddies and playing with my rock band, but what do kids know? Today, I wouldn’t trade that experience for anything.

Anyhow, a week or two after I got there, the rancher brought in a bunch of other high school kids from Casper – there’s lots of grunt work on a sheep ranch during shearing and docking season. One kid, don’t remember his name, brought along a brand new copy of The Beatles’ *Sgt. Pepper’s Lonely Hearts Club Band* album. We didn’t have a record player in the bunkhouse but after our 16-hour days, we’d pore over the album, fascinated by the iconic cover art, by the lyrics that were printed on the inside, by every single word including the copyright notice.

The album was a totem for us; to hold it was to hold a piece of The Beatles. I didn’t hear the actual music until I got back to civilization weeks and weeks later, but by then the album was already a part of my inner life.

Maybe it’s just me and maybe it’s an age thing but I never felt the same sort of connection to CDs and certainly not to streaming music. I think Ms. Swift and other musicians who are releasing their works in vinyl get that and I’m grateful that they’re keeping alive a magical format that is like no other.

Still, CDs have their place. I have shelves full of them at home. I don’t need to listen to them anymore; instead I just say “Alexa, play Glenn Miller everywhere.” But the music on some of those CDs will never find its way to the streaming universe, so I’ll hang on to at least some of my collection. I mean, where else am I going to hear the East German Army Men’s Chorus singing Wagner opera favorites? That one’s a keeper.

See you next time.

Project management jobs pipeline focus of Sandia, University of New Mexico agreement

By Kristen Meub

Sandia and the University of New Mexico’s Anderson School of Management have reached a new agreement to collaborate on project management education and professional development.



PROJECT MANAGEMENT MOU — Associate Labs Director Scott Aeilts and UNM’s Dean Craig White signed a memorandum of understanding to support project management education and professional development. (Photo courtesy of UNM)

The memorandum of understanding supports creating a Master of Science degree in project controls, project management, and program management at UNM and hands-on internship opportunities at Sandia.

Sandia will provide input on course curriculum, desired skill sets needed at the Labs, and expertise that will help prepare graduates for a career at Sandia or any future employer.

“Sandia wants job candidates who are best qualified and prepared to contribute to its national security mission,” Sandia program planning and control standards director Jennifer Plummer said. “This agreement helps us accomplish both. Sandia is growing its project management competency, and this will be an extraordinary benefit for the Labs.”

Dean Craig White said the agreement forms the basis for an ongoing benefit to the Anderson School, Sandia, and the overall community.

“Sandia National Laboratories has indicated a strong desire to hire New Mexico students with graduate-level project management education,” White said. “This MOU provides a framework for direct collaboration in developing an outstanding program through internships, continuing education, and advice on curriculum and delivery.”

Sandia has about 300 project management positions, 38 percent held by UNM graduates. Tristan Walters, a Sandia manager, says the Labs has about 20 job openings in project management and project controls and expects the need to hire skilled project management professionals will continue.

Sandia will offer hands-on, project-management internships focused on providing practical project management experience on real programs. Tristan notes that Sandia now has nine students, and “demand is currently exceeding supply.”

Tristan joined Sandia about nine years ago with a Master of Business Administration in finance and international management from UNM. He started as a project financial analyst, but says he “caught the project management bug” because he wanted to become more involved with Sandia’s projects and programs. He earned a project management master’s certificate from George Washington University and ESI International and completed his project management professional certification while working at Sandia.

“I had to learn and figure it out as I went along,” Tristan says. “I see this as a real opportunity to better prepare these students. They will enter the workforce with the foundation and analytical skills associated with project controls and project management and be ready to hit the ground running instead of working through training and qualification. It will be a more direct path for early staff members.”

UNM already offers several project management courses, and current students can work toward a master’s certificate in project management. The new degree is expected to be approved in 18 months to two years, and students will be able to transfer credits from their master’s certificate toward the new Master of Science degree.

“One of the key things about the Master of Science degree is that we want incoming staff to have a broad and general understanding of engineering practices and approaches,” Tristan says. “It helps our project management controllers and managers be successful at Sandia. Having a systems engineering approach, or at least an understanding of those concepts, is going to help them integrate better with their technical teams.”

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Bill Murphy, Editor ..... 505/845-0845  
Randy Montoya, Photographer ..... 505/844-5605  
Patti Koning, California site contact ..... 925/294-4911  
Michael Lanigan, Production ..... 505/844-2297

Contributors: Michelle Fleming (Ads, Milepost photos, 844-4902), Neal Singer (845-7078), Stephanie Holinka (284-9227), Darrick Hurst (844-8009), Michael Baker (284-1085), Troy Rummmler (284-1056), Valerie Larkin (284-7879), Lindsey Kibler (844-7988), Tim Deshler (844-2502), Mollie Rappe (844-8220), Kristen Meub (845-7215), Michael Padilla (925-294-2447), Julia Bernstein (925-294-3609), Jim Danneskiold, manager (844-0587)

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**A**s Madonna once famously sang, we are living in a material world. Sandia now has a renewed ability to thrive in it, thanks to major recent upgrades in the Laboratories' microscopy capabilities.

The centerpiece of a multiyear strategy to upgrade microscopy on Sandia's California campus is a newly installed, state-of-the-art transmission electron microscope (TEM). The new instrument replaces two older instruments Sandia installed more than two decades ago, and brings the Labs powerful new capabilities for nanoscale analysis of materials.

The TEM works by sending a beam of electrons through a very thin material specimen and onto different sensors to form images or to measure composition. The sensitivity of the sensors in this TEM is higher than in the older machines. In addition, scientists have more control over the electron beam with this TEM.

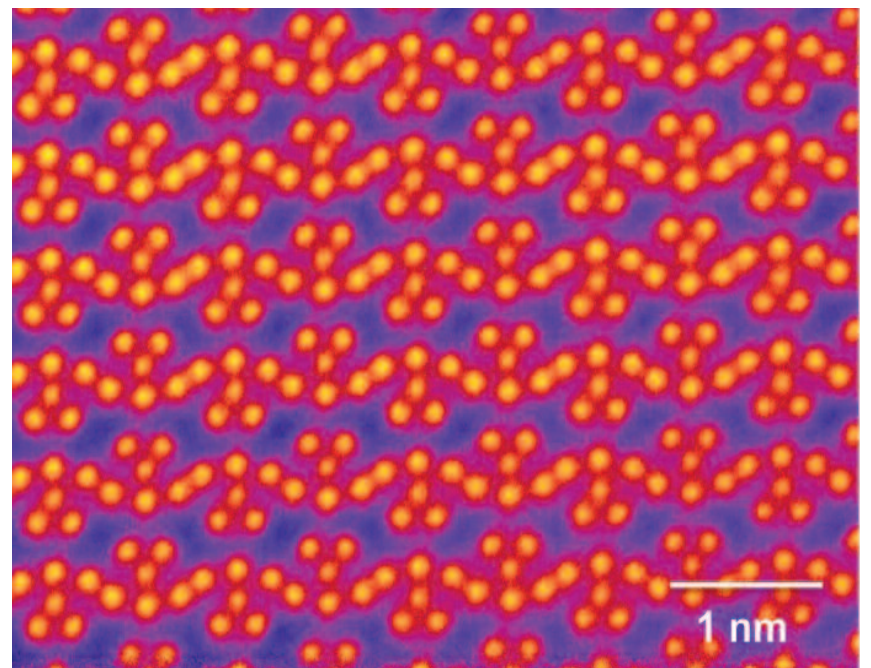
The combination of increased sensor sensitivity and greater ability to control the beam mean that the TEM will not cook delicate organic or biological materials that usually become damaged under high-energy electron beams.

Materials scientist Josh Sugar says the high-speed, high-sensitivity sensor was developed for the detection of light in outer space and individual, sub-atomic charged particles. As it turns out, the sensor is extraordinarily good at detecting electrons as well. It can even measure a single, individual electron, which was previously not possible.

Another nice feature of this machine, Josh says, is that it offers higher energy resolution, which means researchers can learn more about the subtle details of the way atoms are bonded in a material.

Materials scientist Doug Medlin marvels at the precision and resolution of the new TEM compared to machines he used decades ago that required large photo plates. "When we would collect these types of images back in the day, we'd push the exposure button and we'd stop breathing, and wait until it did its thing," Doug recalls. "Any motion in the room would blur the image."

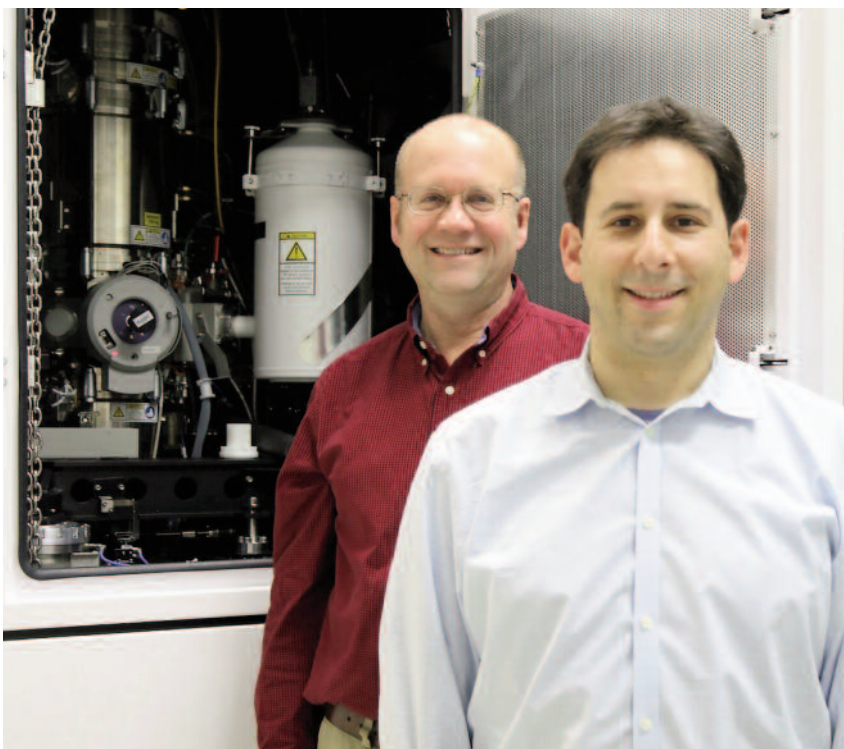
As Doug points out, Sandia has been a pioneer in atomic-scale materials simulations since the 1980s. Such simulations are important for predicting how the arrangement of atoms in a material can affect their mechanical or electronic properties. The



THE TEM PRODUCED this atomic-resolution image of zirconium telluride, a material Sandia researchers are investigating for quantum computing applications. The dots in the image are individual columns of zirconium and tellurium atoms in the material's crystal structure.

# Living in a material world

By Jules Bernstein



SANDIA MATERIALS SCIENTISTS Doug Medlin (left) and Josh Sugar (right) pose in front of Sandia's new transmission electron microscope. Even though the machine occupies most of the room, the samples it analyzes are no longer than a grain of rice and 1,000 times thinner than a sheet of paper.

capabilities of the new instrument provide a sensitive tool for testing how well these simulations actually work.

Not only can the TEM show the atoms that make up a material, it can also determine which elements those atoms are, and probe the 3-D microstructure of the material — all while people are walking around and talking in the control room. "When you have a new tool like this, you can make new discoveries," Doug says.

## State-of-the-art facility for a state-of-the-art instrument

This isn't to say conditions don't need to be controlled in the area surrounding the TEM. "For a high-end microscope like this you have to have high-end facilities: good control of air flow, magnetic fields, vibration, and temperature for it to reach its performance potential," Doug says. "Otherwise it can affect your results."

To illustrate how precisely the TEM's environment is controlled, Doug reports that the temperature in the microscope lab fluctuates less than a degree Celsius over 24 hours. Furthermore, the electrical wiring and materials in the room and adjacent lab spaces were carefully considered to ensure the space would meet the stringent magnetic field requirements for the instrument. A lot of careful planning went into the creation of these conditions — all the more impressive given the short time frame in which the plans had to be executed.

Using the microscope facility as a pilot project for Sandia's new integrated service delivery (ISD) approach, multiple groups on campus partnered to complete the project in eight months, start-to-finish.

"The ISD approach helped our cross-functional team to creatively plan, acquire the hardware, design and make significant laboratory modifications, as well as install and commission the microscope in about half the time it might otherwise have taken," says Strategic Site Planning Manager Devon Powers.

Another important feature is that the microscope can be operated remotely, which will allow others to access the instrument directly from Albuquerque. Doug and Josh pioneered such remote microscopy several years ago so they could easily access an instrument based in New Mexico.

The result of all these features makes the TEM, along with the broader suite of Sandia's microscopy tools and staff, a perfect complement for a wide range of scientific and engineering projects across the Laboratories. The following are just a few of the projects that will benefit.

## Observing bubble behaviors and molecular "tinker toys"

The average person might think of helium as the gas that enables a fun voice-changing gag when inhaled from balloons at parties. But according to Josh, "helium is a specific scientific problem that really needs the new microscope."

The problem is that nuclear weapons use tritium, a radioactive gas. Over time the gas can permeate into steel and decay, producing nanoscale helium bubbles that can crack critical structural components.

Josh has been working on imaging the bubbles inside the metal to inform behavior models. "The new TEM will make the imaging much easier, and that will help us design these systems, change manufacturing procedures, and make better predictions about how these things will work years down the road," says energy nanomaterials group manager Andy Vance.

Similarly, research on a new class of materials called metal organic frameworks (MOF) also stands to benefit from the TEM. MOFs are crystalline materials in which metal ions are linked to organic (carbon-containing) molecules to create a structure. Their regularly spaced pore channels can be modified to accommodate guest molecules of various sizes, and they sport extremely high surface areas.

These properties make them applicable to a dizzying array of applications, including removing volatile radioactive gas from spent nuclear fuel, chemical and radiation detection, microelectronics, hydrogen storage for fuel cell vehicles, and even breathalyzers that indicate infectious diseases.

Chemist Mark Allendorf has been studying MOFs for more than a decade, and refers to them as "tinker toys" for chemists because like the children's toy, the material constituents can be assembled like molecular scaffolding.

Previously, however, it was not possible to look at them using a traditional electron microscope because MOFs are very beam sensitive. The TEM's direct-electron sensor will allow Mark and other scientists to look at the atomic structure of MOFs and at defects in their structure, which can affect properties such as electrical conductivity and gas storage.

## A big suite for tiny things

The tools in Sandia's microscopy suite complement each other, offering scientists a robust set of tools that can help them link what they see on many different length-scales. For example, another machine on site, the focused ion beam scanning electron microscope (FIB-SEM) can perform multiple functions that complement the new TEM, but at a larger-length scale than the TEM (from millimeters to tens of nanometers). It can also fabricate specimens appropriate for atomic-resolution analysis in the TEM.

An SEM uses similar operating principles, but instead of looking through a sample the way a TEM does, the electrons bounce off the surface of a material and generate a detailed image of its topography. It's more like a high-powered pair of binoculars compared to the TEM, where the electrons go through a sample and you get something like a medical X-ray image. The California campus is planning to install a new SEM this year as well.

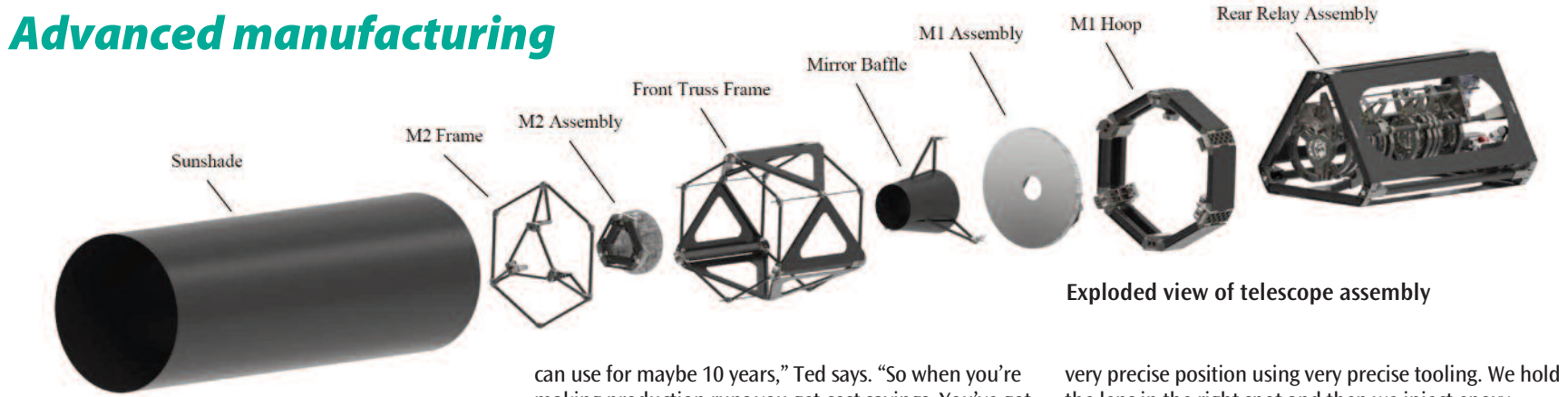
Other recent microscopy upgrades include new polishing equipment in the metallography laboratory where materials are prepared for the microscopes, new arrangement of lab space that make it easier to work in them, and new additions to the microscopy team, like Alan Jankowski, who were hired to facilitate the increased flow of work that the new tools will likely generate.

According to Josh, nothing less than the future of mankind could be determined by the materials that we make. "When I think about the history of civilization and man, I think about the materials that were used. There's the stone age, the bronze age, the iron age. In the stone age, we lived in caves and we had stone tools and we hunted," he says. "Very much, the materials that society used dictated what technologies were available to us and how we lived. And every time we had a major change in the materials that we used, our society and civilization had a major change in what we could do."

Historically, advances in materials have been enabled by parallel advances in technologies to investigate them. These recent investments in materials characterization will help Sandia continue to be a major force in this field.



# Advanced manufacturing



Exploded view of telescope assembly

(Continued from page 1)

Instead of concentrating on printing precision parts, the project focused on how to put less precise 3-D printed parts together with precise tools, taking advantage of the rapid prototyping, design, and manufacturing possible with additive manufacturing.

“That’s the nuance that seems to get lost, that you have to design differently,” Ted says. “It doesn’t plug into a standard design process.”

can use for maybe 10 years,” Ted says. “So when you’re making production runs you get cost savings. You’ve got time savings because you’re not waiting for each piece to be made” by machining.

## Exact tolerances versus precise assembly

There are two ways to approach building any precision structure: make every piece to exact tolerances so assembly is simple, or make rougher pieces and use a very precise assembly process that compensates for shortfalls in dimensions.

Machining creates parts with extremely precise dimensions, but it can’t cheaply make, or in some cases, make at all, the strange 3-D printed designs that may

have advantages in function and weight. Additive manufacturing forms the material — polymer, ceramic, or metal — at the same time it creates a part. Research is ongoing into how that affects the properties of materials and whether changes in properties matter in a particular use.

Design, however, is a separate question.

“Can we design a system that doesn’t care if your material is not as good as you expected it to be? Can you design a system that doesn’t care that your parts aren’t as dimensionally accurate?” Ted says. “If you make yourself insensitive to the things that additive’s not very good at, you

take advantage of all its good things.”

## Sandia seeks patent for piece designed during project

For example, a standard camera has a ledge, which must be very precise because the position of that ledge defines exactly where a lens sits. Sandia’s project, working with lenses for the telescope, created a straight cylinder with no ledges. Instead, “we hold the lens at a

very precise position using very precise tooling. We hold the lens in the right spot and then we inject epoxy around it and lock it into place,” Ted says. “We can make parts that are less precise as far as dimensions are concerned because of the epoxy in the process. It’s the tooling that’s precise.”

Sandia applied for a patent for a monolithic, titanium flexure that’s part of the telescope mirror mount. A flexure refers to a broad range of elements used like joints between rigid bodies. The joint motion, either linear or rotating, is produced by bending the element. Rigidly mounting metal to glass doesn’t work because the two materials expand and contract at different rates as temperature changes, and the glass could deform or even crack.

A flexure acts like a spring, although it doesn’t look like a coil spring. Sandia’s design is roughly cylindrical, about 2 inches long and 3/4 of an inch in diameter, with very thin flexure blades. Three flexure mounts attach to the mirrors with epoxy, relieving expansion and contraction stress where mirrors attach to a carbon fiber backbone.

## Algorithms correct optical image

The precision mechanical design team worked on the project with Sandia optical designer Jeff Hunt and algorithm authors Dennis Lee and Eric Shields. Ted says the lens design creates a raw image with distortions and other errors. The software algorithms correct certain types of errors better than others, so errors in the lens design are the type the algorithms are good at correcting, he says.

“The thought was you could have less precise optics and correct for it with software, essentially after the fact. Similar to how we designed the mechanical hardware to be insensitive to additive manufacturing shortfalls and take advantage of its benefits, Jeff optimized the optics of the system so the software maintained the image properties the algorithms could not have done as good a job correcting,” he says. “You could get the same performance you could have if you spent three times as much money on better optics.”

The project has ended, but Sandia structural designers now are using information from it, he says.

“That was what the project was looking at, how these ways could make it faster and cheaper and just as good,” he says. “If you talk about things you can give up, things you can compensate for after the fact, it opens up realms on the design side.”

Moon				
Object Distance: 384,472 km (238,900 miles) Atmosphere Thickness: 11 km (6.8 miles) near vertical				
	Eyelevel View (50mm f/8.0)	Raw Image	Photo Processed	Turbulence & Bispectrum Correction
Wide (0.5mm)				
Zoom (0.5mm)				
Zoom (100xmm)				

SOFTWARE CORRECTION results in a clear, sharp image.

The team created a lighter weight, less expensive ground-based telescope in about a third the time of a traditionally made telescope for about a fifth of the cost, he says. They used 3-D printed components, modular design and, for the telescope optical design, image-correction algorithms that also helped save money.

The technique shifts money from recurring costs, “where every part has to be precise, to nonrecurring costs, where you’re just buying one set of tools that you

# Metal-organic framework materials

(Continued from page 1)

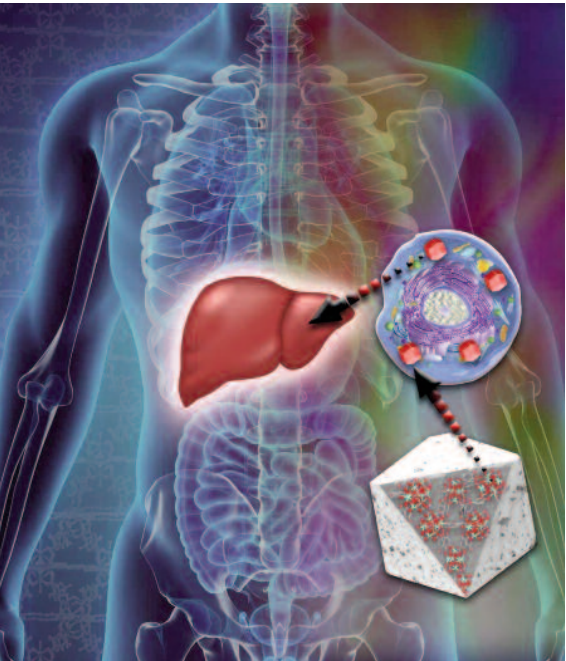
more stable materials invaluable.

MOFs are complex materials with tunable properties and astonishing surface areas; one gram of a certain kind of MOF has the same surface area as 16 basketball courts. “In the field of metal-organic frameworks,” Dorina says, “we have the advantage of choosing our building blocks to make made-to-order materials.”

For 14 years, she has been working on making the synthesis of MOFs more rational and predictable. Some metals are chemically active and others glow at certain colors. Some metals form clusters with different geometries — like tinker toy “hubs” with different numbers of holes — and sometimes the hub is a single metal ion. Some linkers are long, producing sponges with large empty spaces and high surface areas, and others are short. Some linkers are catalytically active — that is, they can speed up a chemical reaction — or can tweak the chemistry of the metal while others can adjust the color or brightness of the metal’s glow.

## Rational design of multifunctional MOFs for bio-imaging

To rationally design MOFs for bio-imaging, Dorina selected lanthanide metals, a class of rare earth elements. The metal europium glows red; the metals neodymium and ytterbium fluoresce in the near infrared. She also chose conditions that would cause the lanthanides to form robust clusters. Frequently, MOFs made with individual metal ions aren’t water-stable, but metal clusters often are, Dorina says. This is important for bio-imaging as cells and people are mostly water. Also, she used commonly available carbon linkers that produce large pores. Potentially, these pores could hold drugs and allow both imaging and treatment.



SCHEMATIC DEPICTION of cell permeable MOF-based bioimaging agents. (Illustration by Lisa Sena-Carian)

Dorina put together a cross-disciplinary team to confirm the MOFs had the properties she engineered. Sandia materials scientist Mark Rodriguez and Karena Chapman of Argonne National Laboratory helped with the X-ray diffraction structural studies. Sandia researchers Lauren Rohwer and Willie Luk tested the MOFs’ luminescence properties. The team successfully made a family of similar MOFs with a range of emission colors from red to near infrared allowing researchers to “tune” the MOF color depending on what it might be needed for.

Then, Dorina’s team tested to make sure the nanoparticles were stable in water and didn’t kill cultured cells. Sandia nanobiologist Kim Butler performed cytotoxicity studies to determine if the MOFs were toxic to mammalian cells. Even at high doses, the nanoparticles were similar to or less toxic than other particles being

studied for bio-imaging, which is a good sign for their future, says Dorina. They were also stable in water or biology-mimicking saltwater for a least a week.

Sandia biochemist Meghan Dailey and bioanalytical chemist Jeri Timlin did live-cell imaging using a customized hyperspectral confocal fluorescence microscope. They showed the MOF particles can work for long-term bio-imaging studies in mammalian cells but might need to be further optimized, perhaps by modifying the surface of the particles, Dorina says.

“We are very excited about the success of these initial studies and are moving forward to investigate their tissue penetration depth, luminescence efficiency, and ultimately, the relevance to imaging in living organisms,” she says.

The research is part of a much larger project to develop adaptable, safe, and effective responses to biological threats and new pathogens funded by Sandia’s Laboratory Directed Research and Development program. An important part of that project is tracking the delivery of nanoparticles, which requires biologically stable glowing particles or dyes.

The results were published in *ACS Applied Materials and Interfaces*. The work was performed, in part, at the Center for Integrated Nanotechnologies, a DOE Office of Basic Energy Science funded user facility jointly operated with Los Alamos National Laboratory.



# Danelle Tanner is 1st Sandian named as LGBTQ+ Scientist of the Year

**Early physics course opened Danelle Tanner's eyes to a world of possibilities**

By Lindsey Kibler

Sandia physicist Danelle Tanner has been named the 2018 Scientist of the Year by the National Organization of Gay and Lesbian Scientists and Technical Professionals. She is the first Labs employee to receive the honor since the NOGLSTP created the award in 2004.

The annual awards were established as a means of identifying, honoring, and documenting the contributions of outstanding LGBTQ+ science, engineering, and technology professionals, as well as the corporations, academic institutions, and businesses that support them.

The organization uses the '+' as a way of including everyone who identifies with or supports its diverse community.

Danelle will be presented her award on Feb. 18 in Austin, Texas, at the American Association for the Advancement of Science annual meeting.

## From nuclear physics to reliability analysis, and everything in between

Danelle joined Sandia in 1984. Early in her career, she led a team responsible for radiation effects testing of multiple weapons system components at the Nevada Test Site, now the Nevada National Security Site. She also led projects in support of multiple underground nuclear weapon and radiation experiments.

In 1993, she joined the microelectronics reliability group where she delved into reliability physics, redefining her career path. She received funding in 1997 for a three-year Laboratory Directed Research & Development project to establish microelectromechanical systems (MEMS) reliability as a differentiating strength for Sandia in this new developing technology.

"This was at the time of early MEMS devices coming to market, and they were things like accelerometers in Nintendo gaming systems and phones, digital micro-mirror projection systems, and ink jet printers. We wanted to understand overall failure mechanisms to see if MEMS could be used in nuclear weapons," says Danelle.

She spent the next decade as a leader in MEMS reliability, sharing her knowledge across the United States and Europe, before leading a team responsible for

determining the root cause of a particularly challenging electrical component failure. After forcing these parts to fail, the team would work in reverse to determine critical design changes necessary to produce more reliable components.

## 'You can do anything you set your mind to'

Danelle grew up the fourth of five children. She always knew she would attend college but didn't know what she wanted to study. When she began her undergraduate studies in the 1970s, she saw nursing and teaching as the two career paths presented to women and expected she would study the latter.

"My dad would always tell me 'Danelle, you can do anything you set your mind to,' and that's what I did. He was always supportive of me and he was committed to

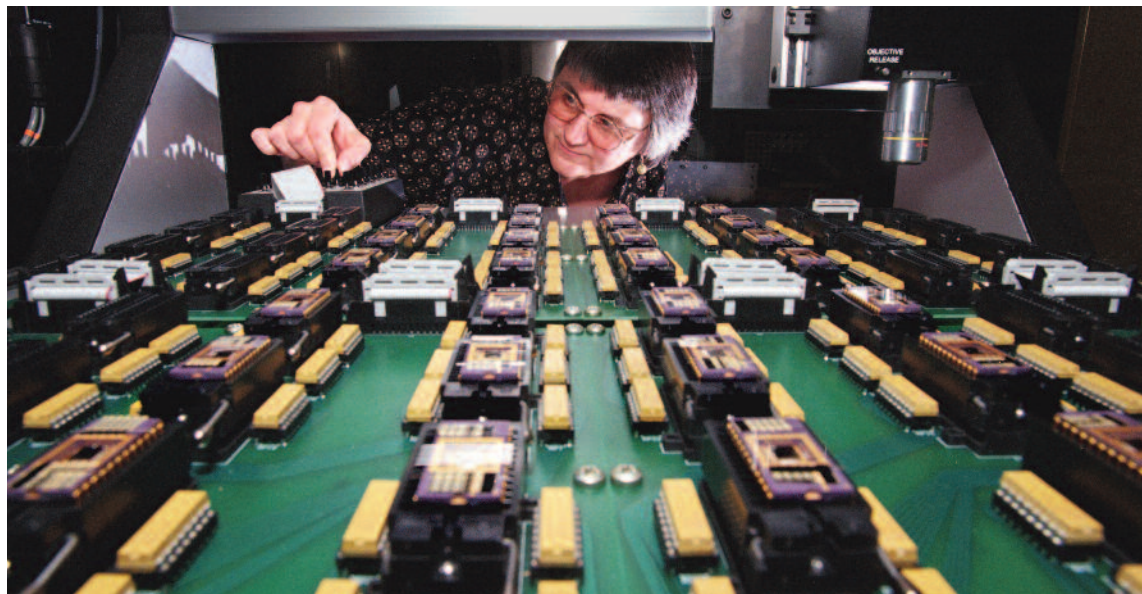
says she feared her sexual orientation would hold her back. Prior to the 1970s, LGBTQ people were not eligible for federal security clearances and so were denied employment in certain professions. It was not until the 1980s, when Danelle was hired at Sandia, that people were able to disclose their sexual orientation on clearance applications.

"The culture wasn't like what it is today," she says. "I was in the closet for a long time. I didn't come out in the beginning of my career because it was a time when many LGBTQ people were uncomfortable with showing their true selves because of concerns about discrimination."

It wasn't until Danelle began dating her now-wife, Wendy, that she began to get comfortable coming out. The two met in 1996 through the Labs' newly created LGBT employee group, of which both were founding



DANELLE TANNER



IN THIS PHOTO FROM 1998, Danelle Tanner tests MEMS reliability using the one-of-a-kind Sandia High-volume Micro-machine Measurement of Reliability, or SHiMMER, instrument. Danelle this year became the first Sandian named as Scientist of the Year by the National Organization of Gay and Lesbian Scientists and Technical Professionals.

(Photo by Randy Montoya)

ensuring all of us went to college," she says.

The first college physics class Danelle took opened her eyes to the possibilities in the field. She says she soon fell in love with science and its ability to explain the world at a fundamental level. The idea of pursuing a career in the field was something Danelle says was outside of her reality at the time — she was in the minority in the field, both as a woman and a lesbian — but she pursued it despite this. She earned a bachelor of science degree in physics and mathematics from the University of Southwestern Louisiana, and a doctorate in nuclear physics from Texas A&M University.

## 'I was in the closet for a long time'

Despite a successful, decades-long career, Danelle

members. With the group's support, Danelle approached management to discuss equal opportunity employment benefits. Her talks were crucial in securing domestic partner benefits for Sandia employees, ahead of state or federal marriage equality legislation and prior to July 1, 2003, when New Mexico enacted a new anti-discrimination law.

Danelle and Wendy were one of 64 couples legally married during a brief period in 2004 when one New Mexico county clerk began issuing marriage licenses to same-sex couples. The couple has two sons.

"There was a point in my life I would have never thought a recognition like this would be possible," she says. "A lot of work went into getting here and I am absolutely thrilled to receive this honor."

## 'Only one lifelong mentor'

Postdoctoral associate Robin Jacobs-Gedrim still keeps a copy of a letter he wrote nearly 15 years ago when he was a sophomore at Albuquerque's Valley High School. He had recently been accepted into a Sandia internship program and was placed in microelectronics and MEMS. While seeking out mentors, he came across a familiar name — Danelle Tanner.

"Dear Dr. Tanner, when I was in 2nd grade you came to my classroom to give a talk on basic physics. The lecture sparked my love for the sciences. Later in elementary school, when asked what I wanted to be when I grew up, I would reply 'a theoretical physicist.'"

Danelle remembered the time fondly. It was 1990 when DOE began funding an educational program at Sandia. The program's goal was to pair Sandia employees with local schools, where they would serve as science advisors, or SciAds.

Danelle visited Albuquerque's Alvarado Elementary School one day a week. She spent the first half of the day with the students doing hands-on experiments using science kits provided by Sandia. The idea was to introduce the use of inquiry based on science instruction. In the afternoons, she met with teachers to offer ways they could include more hands-on opportunities during science lessons, like using lasers and magnets or making slime.

The SciAd program ended in 1995 but it had a lasting impact on Robin. In his letter, he explained his upcoming internship would place him in nanotechnology and

## Postdoc Robin Jacobs-Gedrim praises influence of researcher Danelle Tanner

asked if he could work under her mentorship for the school year. Without hesitation, Danelle agreed.

"How could I not hire him after that letter?" she says. "Each year I would return to the school and bring a different experiment into his classroom. He was always the most responsive and he seemed to absolutely love it. I knew he would make a great addition to my team and I was happy to have him."

Robin continued to intern at the Labs through his undergraduate studies. The experience, he says, set the bar for his expectations of a professional work environment. He would later attend schools in Florida and New York, but spoke with Danelle often.

"There was a time in which the last place on earth I wanted to live and work my entire life was Albuquerque. I very much wanted to get out and explore the world and my options," Robin says. "Having experienced other places to live and work I realized Sandia, and Albuquerque, were pretty great."

The SciAd program, Robin says, is perhaps the reason he is a scientist today, adding that the experience he's gained over the years stretches far beyond the field of nanotechnology.

"It is incredibly valuable to have a mentor in science who is not directly connected with my present work. I have had many scientific advisors with whom I have worked on specific projects but only one, lifelong scientific mentor — Danelle Tanner."

— Lindsey Kibler



ROBIN JACOBS-GEDRIM chats with Danelle Tanner, the Sandia researcher who inspired him to pursue a career in science when she visited his second grade classroom more than two decades ago.

(Photo by Randy Montoya)



Mileposts



New Mexico photos  
by Michelle Fleming



Ray Gabaldon 35



Sandra (Tanny) Mays 35



Tony Trujillo 35



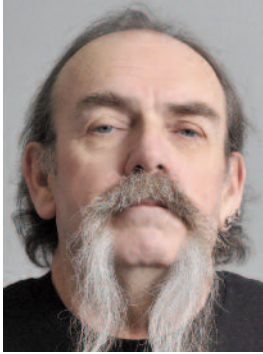
John Cresap 30



Hans Oldewage 30



Steve Trujillo 30



David Van Ornum 30



Mark Freeman 20



Kevin Lederer 20



Larry Zamora 20



Marissa Ballantine 15



Bill Beenau 15



Carol Eiffert 15



America Fritz 15



Anand Ganti 15



Robert Hanzlik 15



Kim Hussong 15



Roger Kite 15



Tom Lowry 15



Jonathan Milton 15



Jaclyn Murton 15



Kevin Romero 15



Ralph Romero 15



Carolyn Ugarte 15



Ed Vieth 15

Lab News rack locations

The Lab News is delivered to newspaper racks in the locations listed below every other Thursday afternoon.

Bldg. 802, elevator lobby  
Bldg. 810, east lobby  
Bldg. 822, south entrance  
Bldg. 858 EL, lobby  
Bldg. 880, Aisle D, north lobby  
Bldg. 892, lobby  
Bldg. 894, east entrance, lobby  
Bldg. 898, east lobby  
Bldg. 887, lobby  
Bldg. 891, lobby  
Bldg. 836, lobby  
Bldg. 831/832 north lobby

Bldg. 861, Cafeteria lobby  
Bldg. 870, lobby  
Bldg. 823, lobby  
Bldg. 701, next to elevator  
IPOC, lobby  
CGSC, lobby  
CRSI, lobby  
M.O. 308, lobby  
Bldg. 960, lobby  
Bldg. 962 (TA III), lobby  
Bldg. 6585 (TA V), lobby  
Bldg. 905, lobby  
800(A), outside of Vicki's

Recent Retirees



New Mexico photos by Michelle Fleming



Larry Andrews 41



David Samuel 41



Florian Lucero 38



Fran Nimick 37



Dan Lucero 36



Rochelle Lari 35



Ron Hoskie 32



Roy Jorgenson 28



Melissa Miller 27



Pierrette Gorman 15



SANDIA CLASSIFIED ADS

MISCELLANEOUS

HEADBOARD, Thomasville, Cordova king, marble-top dresser, \$450 OBO; 4-person desk, Pottery Barn, espresso, \$150 OBO. To, 553-1611.

PUGG, 6 Foot Portable Soccer goals. 2 goals with bag. Very good condition, \$50. Montoya 296-4268

TIMESHARE, Squaw Valley (North Lake Tahoe, CA), 1 wk., free, no transfer fees. Allen, 916-622-6302.

‘GAME OF THRONES’ DVDS: season 2, \$15; season 3, \$20. McDonald, 907-830-4938.

PERSONAL MINI-REFRIGERATOR, & small microwave, used, in great working condition, kept clean, \$100. Hennessey, 505-506-7936.

CRIB w/mattress, \$200; dining table/chairs, \$200; 2 recliners, \$50 ea.; coffee/end tables, \$75/set; all OBO. Williams, 505-362-2279.

HINGED BRACELET, John Hardy, 18K gold & sterling silver, Naga kick cuff, \$700. Copland, 510-292-5032, in Albuquerque.

GAS DRYER, Maytag Neptune, bisque/light almond color, 1 owner, nice condition, \$120. Ludwig, 856-5111.

DINING TABLE, large, light wood, matching hutch, a lot of storage, 8 chairs, Southwest pattern, great condition, \$800. Keliiaa, 505-363-5461.

MOTORCYCLE JACKET(S), Joe Rocket, yellow, large and small sizes, excellent condition, \$100 ea. Willmas, 505-281-9124.

PIANO, Lowrey, 57” x 24” x 40”, excellent condition. Huppertz, 286-3287.

TOYOTA TUNDRA REAR SEAT, 60/40 split, folding, extended cab, fits model years 2000-2006, \$95. Harding, 505-977-0897.

MOTORCYCLE JACKETS, mesh, Joe Rocket, w/removable pads, 1 red, 1 blue, \$40 ea. Hanks, 249-1931.

WAGNER POWER PAINTER, \$45; propane grill, \$30; Sigma acoustic/electric guitar, \$150; various garage/lawn power tools. Mills, 217-621-2492.

JOIN FABULOUS FELINES, Wild Love Valentine’s celebration, <http://fabulousfelines.org>. Stubblefield, 263-3468.

MOTORCYCLE GEAR: HJC helmets, w/receive/transmit capability, \$120 ea.; Tourmaster Jackets, 1 new, 1 worn once, \$145. Wells, 505-292-0179.

SOFA & LOVE SEAT, matching, dark chocolate, faux leather, recently purchased, comfortable, like new condition, \$600. Pacheco, 505-508-6795.

ENTERTAINMENT CENTER, oak, 8 sections, built-in light fixtures, great condition, photos upon request, \$1,100 OBO. Garcia, 505-280-5815, ask for Frank.

How to submit classified ads

DEADLINE: Friday noon before week of publication unless changed by holiday.

Submit by one of these methods:

- EMAIL: Michelle Fleming ([classesads@sandia.gov](mailto:classesads@sandia.gov))
- FAX: 844-0645
- MAIL: MS 1468 (Dept. 3651)
- INTERNAL WEB: From Techweb search for ‘NewsCenter’, at the bottom of that page choose to submit an ad under, ‘Submit an article’. If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.

Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No “for rent” ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

RACK SHELVES, Gorilla, heavy-duty metal, \$60; portable gazebo canopy tent, 9’ x 9’, \$30; monster steamer, \$30. Sutton, 202-450-7359.

‘LES MISÉRABLES’, at Popejoy, May 12, 8 p.m., front row center mezzanine, \$170/for 2, (\$85 ea.). Verley, 480-5109.

‘96 CHEVY CAPRICE, white, 1 owner, garaged, 97K miles, full records, \$2,900. Furnish, 884-6626.

RECREATION

‘14 OUTBACK TERRAIN 210TRS TRAVEL TRAILER, 23-ft., bunks beds, great condition, \$20,500 OBO. Crespin, 505-459-5199.

TRANSPORTATION

‘03 SUZUKI XL-7 LIMITED SUV, 4-dr., AT, AC, white, only 70K miles, excellent shape, \$5,000 OBO. Anderson, 505-293-2490.

‘09 ACCORD, V6, 2-dr., 6-spd., leather, sunroof, navigation, 6-disc changer, white, 104K miles, \$7,500. Valerio, 505-331-7042, ask for Isaac.

‘95 FORD EXPLORER, 4WD, AC, maroon, new tires, inside good, 104K miles, \$2,000 OBO. Kunzler, 505-750-4696, ask for Kurt.

‘05 LEXUS IS 300, white, clean title in hand, 114K miles, \$7,500. Robertson, 505-506-9637.

‘16 FORD F150, crew cab, RWD, silver, bed liner, warranty, 30K miles, mint condition, \$24,500. Perrine, 505-363-3072.

‘05 DODGE DAKOTA SLT, club cab, w/shell, 4x4, tan, 60K miles, excellent condition, \$8,000. Tenorio, 505-217-6422.

REAL ESTATE

5-BDR. HOME, 3 baths, 4,280-sq. ft., separate in-law quarters, swimming pool, pre-inspection done, 817 Lamp Post Circle. Ramos, 972-951-0290.

3-BDR. HOME, 3-car garage, 1,730-sq. ft., mountain views, open-concept, beautiful upgrades, 3 yrs. old, 25 min. to Sandia/Los Lunas. Gallegos, 505-263-4456.

25.5-ACRE RESIDENTIAL LOT, Tijeras, 15 mins. to Tramway, trees, views, MLS# 910263, \$219,500. Dotson, 505-850-2939.

WANTED

KID’S PLAY KITCHEN, w/drawers, oven, stove top, etc. for toddler. Rockwell, 505-250-3737, ask for Merrie.

Valentine’s gift bolsters United Way program

\$50,000 donation helps launch Mission: Families

By Michael J. Baker

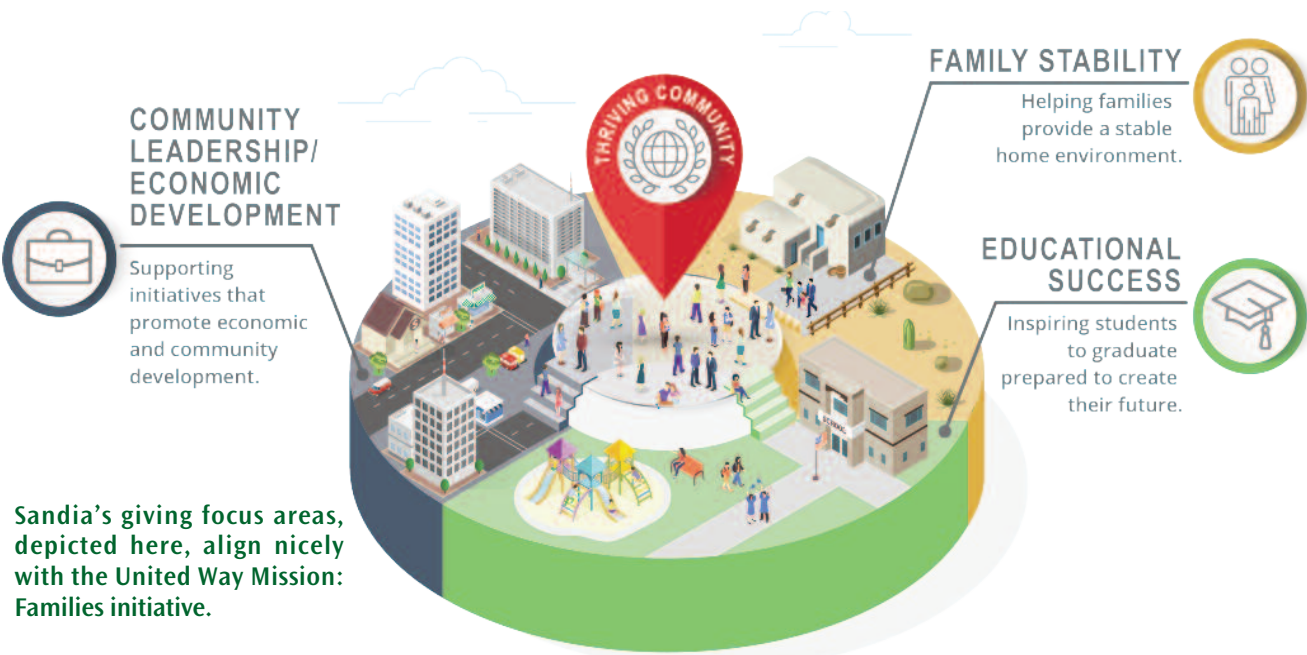
Spreading love on Valentine’s Day, Sandia donated \$50,000 to help kickstart United Way of Central New Mexico’s Mission: Families to foster family stability and support student achievement.

“Sandia National Laboratories is committed to making a difference in the lives of those around us,” Labs Director Steve Younger says. “Sandia has a long and distinguished history of partnering with the United Way, and we hope this latest donation will help launch Mission: Families and the important work to be undertaken.”

The donation will act as a catalyst for other donations to Mission: Families, says Kirby Jefferson, chair of the United Way of Central New Mexico board of directors.

“We appreciate the leadership Sandia National Laboratories is providing for our new initiative, Mission: Families, and look forward to the partnerships that will be created by their inspirational gift,” Jefferson says. “Our extensive research indicates the community is supportive of focused strategies that will benefit families and lead to greater success in our goal toward a higher graduation rate.”

Steve presented Sandia’s donation Wednesday during a meeting of the Economic Forum of Albuquerque at the Hotel Albuquerque. He was appearing at the



“Sandia has a long and distinguished history of partnering with the United Way, and we hope this latest donation will help launch Mission: Families and the important work to be undertaken.”

— Sandia Labs Director Steve Younger

forum to update the business community on Sandia’s national security work and economic impact.

Many of the charitable goals and community accomplishments of Sandia and the United Way align nicely. United Way is working to increase prospects for secure and stable homes for children, improve children’s safety and well-being, and support working families and student success from cradle to career.

Mission: Families will focus on family stability and education and youth development through program investments with non-profit, government, business, and community partners. Through Mission: Graduate, United Way has already been working on the career aspect, engaging in education and youth development efforts in the community while working with hundreds of partners with the goal of 60,000 new graduates with post-secondary

certificates or degrees in central New Mexico by 2020.

The United Way priorities are a perfect fit with Sandia’s new charitable giving priorities of family stability, educational success, and community and economic development, says Sandia Community Relations Manager Amy Tapia. Sandia’s giving priorities, she says, aim to help families provide stable home environments, inspire students, and grow local businesses and job opportunities in the communities where Sandia employees work and live.

Sandia and its employees are committed to continuing to make a difference through charitable work. Employees and retirees annually contribute more than \$5 million to nonprofits in New Mexico, California, and the nation through the United Way of Central New Mexico during its annual giving campaign, which begins in October.



# Preparation meets opportunity

*For Div. 9000 ALD Mark Sellers, diverse career stops all pointed toward Sandia leadership role*

By Janeen Miller

Becoming the Associate Laboratories Director for Mission Assurance (9000) at Sandia National Laboratories wasn't something Mark Sellers aspired to. "I really believe that my being at Sandia is a case of 'preparation meeting opportunity,'" Mark says. "I have a deep passion for mission and quality assurance programs — I want to share my experience and team with our mission partners to help Sandia become something even better than it is today."

"What we do isn't glamorous," Mark says about Mission Assurance. "As an enabling organization, we must be exceptional at what we do and work behind the scenes for the betterment of the Labs as a whole. We help build better organizations from the inside — putting the needs of others first and developing people to perform at their highest levels."

Mark credits his parents, work experience, and key mentors for helping him embrace a leadership style that emphasizes service and personnel development.

## Early defining moments

Mark was born in Fullerton and raised in Diamond Bar, California, where his father Michael was a computer programmer at General Dynamics and his mother Janet, an elementary school teacher in Pomona. The second of three boys, Mark was a regular, happy kid.

"My parents divorced when I was in middle school," Mark says. "That was a real defining moment for me — when childhood ended and the real world revealed itself. I learned to be more self-reliant and dove headlong into my studies."

His dedication paid off. From the end of 7th grade

## A Corvair love affair

Mark's stepfather, Vern Brown, was a Corvair enthusiast who shared his love of the sleek Chevrolets with Mark, and the two bonded as they worked on Mark's first car, a powder blue, 110 horsepower, two door Corvair coupe they purchased for \$800.



"Vern was a blue-collar guy, with a good heart and a humble attitude," Mark says. "He taught me to get done what needed to get done, and not to make a big deal out of it. A solid life lesson that I took to heart."

After his first Corvair was totaled in an accident, Mark and his parents drove to Palm Springs, California, and purchased the 1965 Corvair Mark still owns today. "I drove this Corvair through my junior year in college, when it started to run hot and make terrible noises," Mark says. The Corvair was then lodged in various locations and towed through several moves before ending up at his mother's home in Arizona, where it resided until Mark was ready to begin restoring it in 2010.

"The car had been stored outside, so we had to dig it out of 15 years of mud and dirt before shipping it to a shop in Pennsylvania," Mark remembered. It took about three years for a full end-to-end restoration, but the result was worth the wait. "Once the car was completed and in pristine condition, my stepfather and I had the chance to take a few drives before he passed away in 2015," Mark says. "Now, my wife and I cruise in the Corvair on weekends. It reminds me of good times."



Photo by Randy Montoya

DIV. 9000 ALD MARK SELLERS

through high school, Mark received straight As on his report cards. In high school, his mother would often chide him to stop studying, turn off the light, and go to bed. Voted "Hardest Worker" by his classmates, Mark graduated as senior class vice president, a top seeded tennis player, and one of four valedictorians. While he liked most of his classes, Mark excelled in physics and math.

Mark attended Harvey Mudd College in Claremont, California.

"Harvey Mudd is a great engineering school, with a focus on teaching students independent thought toward creative problem solving. Plus, they offered me the most financial aid," says Mark. After nearly failing out his freshman year, Mark settled in to school and graduated with distinction, earning his bachelor's degree in general engineering in 1987.

"To earn spending money, I worked summers during my college years for my stepfather, who was a general contractor. It was a great job — I learned to frame homes, hang drywall, pour concrete, lay tile, install plumbing and sprinklers, and plant landscaping — I learned a lot those summers," Mark says. "Installing fiberglass insulation was the worst."

## Getting to work

Mark took his first job after college with aerospace company TRW, working on the Peacekeeper and Minuteman guidance systems in the ballistic missile office at Norton Air Force Base in San Bernardino, California. "Looking back, this was one of the greatest working experiences of my career," Mark says. "TRW was co-located with the Air Force customer — we were all working toward the same goals with the same mission."

Through a TRW fellowship, Mark earned his master's degree in electrical engineering, with a specialty in microelectronics and integrated circuits, from the University of Southern California, commuting an hour to and from campus for school projects. He and his wife also welcomed two children, a son and a daughter.

Mark and his young family relocated when Norton Air Force Base was closed and the project was moved to Hill Air Force Base in Utah in 1993, but weren't happy with the move. When his boss transferred to a project engineering role on the Yucca Mountain Nuclear Waste Repository design project, Mark leaped at the opportunity and moved to that project, based in Las Vegas, Nevada, in 1994.

As the team lead, supervisor, and then department manager in systems engineering, Mark led the testing and performance confirmation program that analyzed data to assure that the design of the high-level radioactive waste repository would meet all safety, health, and environmental requirements.

"We ran predictive models that evaluated performance for up to a million years," Mark said. "We ensured that the design of the proposed repository system was sound." The work Mark and his team docu-

mented eventually contributed to the application of a license for the project with the Nuclear Regulatory Commission.

While working on this project, Mark earned a master's degree in business administration at the University of Nevada at Las Vegas, which he completed in 2000. He was also selected to participate in a prestigious Six Sigma process improvement training program through Bechtel-SAIC, the consortium that had won the Yucca Mountain project from TRW in 2001.

"Through the Bechtel-SAIC program, I received Six Sigma training and spent two years tackling some of the biggest, hairiest problems at Yucca Mountain," Mark says. "These assignments immersed me in the areas of quality and safety. All designs and data collection underwent rigorous, formal quality processes, and the site established a strong safety culture that earned OSHA's Voluntary Protection Program (VPP) certification for excellence."

## The Northrop Grumman years

After completing the two-year program in 2004, Mark was lured away from Bechtel-SAIC by old colleagues from TRW, which had been absorbed by Northrop Grumman (NG). Northrop Grumman wanted to increase the technical acumen in its quality and mission assurance functions, and hired Mark to provide system engineering expertise as a mission assurance resource in its missile defense division, primarily for the Kinetic Energy Interceptor and Ground-Based Missile Defense programs headquartered in Virginia.

"Northrop Grumman was looking to create mission assurance as a discipline, modeling its program after the Missile Defense Agency and NASA," Mark says. "Michael Greenfield, who had served in a leadership capacity at NASA and was now with NG, became my mentor and friend, and taught me a lot about mission assurance and executive leadership. I still have a list of 'words of wisdom' from him."

Mark moved into various mission assurance leadership positions at NG, serving in missile defense, intelligence, and cyber security divisions. "These positions gave me exposure to the broader intelligence communities and to full spectrum cybersecurity."

In 2015, NG consolidated two sectors, leaving Mark without an executive-level position. "This was another real turning point for me — it was hard," Mark says. "But I was given some good advice: 'You can choose to be bitter, or you can choose to be better.' I chose to be better." Although he took a demotion to stay with Northrop Grumman, Mark was the recognized leader chosen to be one of the key personnel in the NTESS bid for the Sandia management and operation contract.

Now, as ALD of Mission Assurance, Mark looks to use and share the broad knowledge and experience he has



MARK SELLERS AND HIS WIFE, ANN, on their wedding day in 2009 with their blended family, including Mark's two children and Ann's three. (Photo courtesy of Mark Sellers)

gained throughout his career — in systems engineering, quality, mission assurance, cybersecurity, and weapons quality and surety — to lead a new division at Sandia.

## At home

Mark and his wife Ann, who he married in 2009, share a blended family that includes Mark's two children and Ann's three. Their family continues to grow, with both of Mark's children getting married last summer.

"We sold a house, drove across country with the dog, bought a new house, moved in, had two weddings, and gained a son-in-law and a daughter-in-law," Mark laughed. "Without even mentioning Sandia and standing up a new division, it's been a busy year."

When they can slip away, Mark and Ann enjoy visits to their vacation rental property in Duck, North Carolina. "I try to get in some fishing, if I can catch up with the home maintenance for the beach house. Good thing I spent those summers working for a general contractor."